Knowledge Transfer in Audit Firms*

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November 3, 2018

Abstract

We utilize the setting of the rapid audit market consolidation in China over the past twenty years to study knowledge transfer in audit firms. We employ a difference-in-difference approach and examine whether industry-specific knowledge transfer occurs after a merger of two audit firms with different levels of expertise in a particular industry. For clients in an industry audited by both merging audit firms, those audited by the less competent audit firm in that industry belong to the treatment group, while all other clients belong to the control group. Consistent with the existence of knowledge transfer, we find an economically significant improvement in audit quality (as reflected in a reduction in misstatements and an increase in modified audit opinions) for the treatment group relative to the control group in the same merged audit firm.

Keywords: Knowledge Transfer, Audit Firm Merger, Industry Expertise, Audit Quality.

JEL Classification: M42.

* We gratefully acknowledge helpful comments from Sanjeev Bhojraj, Simon Dekeyser, Like Jiang, Andrew Karolyi, Jeong-Bon Kim, Seil Kim, Clive Lennox, Chen Li, Robert Libby, Vic Naiker, Xi Wu, Xing Yang, Eric Yeung, and Liandong Zhang, as well as seminar participants at Baruch College, City University of Hong Kong, Cornell University, the Shanghai University of Finance and Economics, the University of Melbourne, and the Second Dragon-Horse Accounting and Finance International Symposium.

1. Introduction

Audit firms are knowledge-intensive organizations (Starbuck 1992), and they can derive competitive advantage by transferring knowledge internally (Argote 1999; Argote, Ingram, Levine and Moreland 2000; DeFond and Zhang 2014). Knowledge transfer in organizations is formally defined as "the process through which one unit (e.g., group, department, or division) is affected by the experience of another" (Argote and Ingram 2000, p. 151), and it is manifested through changes in performance (Argote and Ingram 2000). Knowledge transfer can occur through various mechanisms, such as training, communication, observation, replicating routines, personnel movement, and technology transfer. In this paper, we extend this literature of organizational learning and knowledge management to audit firms.

To perform an efficient and effective audit, auditors must possess knowledge along several dimensions, such as general domain knowledge of accounting and auditing standards, subspecialty knowledge related to specific industries or clients, and general business knowledge (Libby and Luft 1993; Nelson and Tan 2005; PCAOB 2015).[1] We use the setting of audit firm mergers to investigate the transfer of industry-specific knowledge between different units within an audit firm. For illustration, consider a merger between two hypothetical audit firms: firm A specializes in the mining industry; firm B is a non-specialist, and has clients in both the mining industry and the entertainment industry. Firms A and B merge to form firm AB. The question is whether, after the merger, firm A's specialized knowledge about the mining industry transfers to firm B. Following

[1] Auditors' knowledge can be categorized into either explicit or tacit (Tan and Libby 1997; Vera-Muñoz, Ho and Chow 2006). Explicit or technical knowledge (or "know-what") can be captured and stored, and is often transferred through formal channels facilitated by information technology. Tacit or procedural knowledge (or "know-how") manifests itself in terms of intuition, insights, beliefs or values. It cannot be easily articulated or stored, and is typically transferred through personal interactions (Bol, Estep, Moers and Peecher 2018). The crucial role of procedural knowledge has been well established in organizational behavior research and is expressed in the adage that "the effects of what you do depend on how you do it" (Brockner, Chen, Mannix, Leung and Skarlicki 2000, p. 138). Knechel (2000, p. 706) also notes that "this knowledge is rarely documented and often difficult to link to specific assertions or audit risks, it is nevertheless vital for conducting an efficient and effective audit."

prior literature on knowledge transfer (Darr, Argote and Epple 1995; Baum and Ingram 1998; Ingram and Simons 2002), we use changes in audit performance to measure knowledge transfer.[2] In this simple example, an improvement in the audit quality for firm B's clients in the mining industry (i.e., the treated clients) after the merger, relative to that for the control clients,[3] would constitute evidence of industry-specific knowledge transfer. The comparison between these two groups of clients removes the variation common to all clients in the merged audit firm and the common time-series changes in audit performance.[4]

The audit firm merger setting has several desirable features. First, a merger of two audit firms with different levels of expertise in a particular industry results in industry knowledge heterogeneity in the merged audit firm. This heterogeneity is fertile to identify a set of recipient units in knowledge transfer (i.e., the treatment group). Because an audit firm often has clients in multiple industries, those units not in this particular industry can serve as the control group.

Second, a merger removes or at least substantially dismantles the organizational boundaries between the merging firms, and thus represents an economic shock to the channels through which knowledge transfer between the merging firms occurs. Post-merger integration often involves the development of information technology (e.g., knowledge databases, group support systems, or intranets) that facilitates knowledge sharing and communication. To achieve unified quality control, the merged firm usually develops audit routines that combine the best practices of the

[2] As pointed out in Argote and Ingram (2000), the other approach, assessing knowledge transfer through measuring changes in the knowledge of the recipient unit (with techniques such as questionnaires or verbal protocols), is ill-suited to settings in which a significant amount of knowledge is tacit and cannot be easily articulated.

[3] Our results are insensitive to the following choices of control clients: (1) both firm B's clients in the entertainment industry and firm A's clients in the mining industry, (2) only firm B's clients in the entertainment industry, or (3) only firm A's clients in the mining industry.

[4] We do not claim that the improved audit performance for the treated clients is *entirely* driven by knowledge transfer. As discussed later in this section and Section 5.5, auditor competencies are not independent of their incentives, and audit performance reflects the joint competency and incentive effects. We conduct extensive empirical analysis to ensure that our results are not *purely* driven by the incentive effect.

merging firms.[5] Training and gathering organized by the merged firm also provide a platform for audit personnel originally employed by different firms to establish personal relationships, share experience, and interact. Moreover, employment affiliation fosters the development of social ties through homophily (i.e., an affinity for similar others), which, in turn, enhances mutual trust and facilitates the transfer of tacit knowledge (Rogers and Bhowmik 1970; Granovetter 1985).[6]

Finally, while merger decisions are endogenously determined at the firm level, audit quality are measured at the individual client level rather than the audit firm level. Our empirical tests exploit across-client variation while removing common factors that affect all units in the merged audit firm (e.g., auditor incentives captured by auditor size) through fixed effects.

The above three features of this setting enable us to test whether industry-specific knowledge transfers from the more competent to the less competent units after the merger. It is also worth noting that the knowledge heterogeneity between firm A and firm B does not automatically translate into knowledge transfer from A to B. Knowledge transfer requires A's dissemination and B's assimilation, both of which depend on one's ability, willingness, effort and opportunity. An Ernst & Young survey reports that 87 percent of executives view knowledge as critical to competitiveness, but 44 percent of them rate the extent of knowledge transfer inside their organization as poor or very poor (Stimpson 1999, p. 36). Simon (1973, p. 270) has long noted that "the scarce resource is not information; it is processing capacity to attend to information." Empson (2001) discusses various impediments to knowledge transfer (e.g., the fears of

[5] The Chinese Institute of Certified Public Accountants (CICPA) required merged audit firms to achieve post-merger uniformity of personnel, finance, services, technology standards and information management. The CICPA was also committed to providing special training and instructions to merged audit firms with respect to unified management and quality control.

[6] Existing literature shows that units are more likely to learn best practices from units in the same organization than from units in a different organization (Argote, McEvily and Reagans 2003). Our maintained hypothesis in this paper is that the formal and informal channels for knowledge transfer between the merging audit firms are stronger after the merger than before the merger. We rely on this time-series variation induced by the merger event to avoid the daunting task of developing empirical measures of all the (observable and unobservable) channels for knowledge transfer.

exploitation and contamination) in mergers between professional service firms. Thus, it remains an empirical question as to whether knowledge transfer occurs in a setting where knowledge heterogeneity exists.[7]

We utilize a large sample of audit firm mergers in China over the past twenty years to test the phenomenon of knowledge transfer within audit firms. Unlike the U.S. audit market, which is dominated by Big N auditors, China's audit market is quite fragmented among domestic audit firms and the international Big N audit firms. However, there has been a trend toward consolidation in the audit market due in part to China's rapid economic development and regulatory changes. We have a sample of 46 mergers that took place over the period 1998–2013, in which both merging audit firms had a license to audit listed companies in China. For each merger, we identify treated clients based on the relative industry expertise of their auditors before the merger, where industry expertise is based on an auditor's industry market share (Balsam, Krishnan, and Yang 2003; Chin and Chi 2009; DeFond and Zhang 2014).[8] In the above simple example, firm B's clients in the mining industry belong to the treatment group, while all other clients belong to the control group.[9]

We employ a difference-in-difference approach and examine whether the audit quality for the treatment group improves after the merger (three-year post-merger versus three-year pre-

[7] The existence of individual heterogeneity within the same audit firm is well documented in prior research (e.g., Libby 1981; Bonner and Lewis 1990; Libby and Tan 1994; Gibbins and Swieringa 1995; Bonner 2008; Nelson 2009; Gul, Wu and Yang 2013; Aobdia, Lin and Petacchi 2015; Ke, Lennox and Xin 2015; Knechel, Vanstraelen, and Zerni 2015; Li, Qi, Tian and Zhang 2017; He, Kothari, Xiao and Zuo 2018; Lennox and Wu 2018).

[8] Archival auditing research commonly uses industry market share to measure expertise and generally finds consistent evidence (DeFond and Zhang 2014). We also find lower audit quality for client companies audited by auditors with lower industry market share. To the extent that industry market share does not accurately reflect expertise, our classification of treated clients based on this variable can lead to an underestimation of the true treatment effect and bias against finding evidence of knowledge transfer. Our results are robust with alternative definitions of treated clients that take into account the within-audit firm industry portfolio share or client size (see Section 5.1).

[9] Consider a more complicated situation: firm A has clients in two industries: (a) mining, and (b) electronics; firm B has clients in three industries: (a) mining, (b) electronics, and (c) entertainment. Firm A specializes in the mining industry while firm B specializes in the electronics industry. In this case, firm A's clients in the electronics industry and firm B's clients in the mining industry belong to the treatment group, while all other clients belong to the control group.

merger), relative to that for the control group. Our empirical tests focus on the within-merged-firm variation by including merger fixed effects. This design allows us to examine across-client variation while removing all of the effects at the merged audit firm level. We use two audit quality measures, misstatements and modified audit opinions.[10] These two measures have relatively low measurement error and offer relatively strong evidence of poor audit quality (DeFond and Zhang 2014). In a univariate analysis, the treatment group's misstatement frequency declines from 9.10 percent before the merger to 4.95 percent after the merger, and the frequency of modified audit opinions increases from 5.98 percent before the merger to 8.16 percent after the merger. The corresponding changes for the control group are much smaller. Using a difference-in-difference research design and a logistic regression model, we again find an economically significant improvement in audit quality for the treatment group relative to the control group in the same merged audit firm. We interpret this as evidence of knowledge transfer in audit firms.

We conduct a battery of additional tests to ascertain the robustness of our results. First, we use alternative definitions of treated clients that consider (1) the industry expertise level of the more competent auditor in the merger when compared with all other auditors, (2) the gap in industry knowledge between the two auditors involved in a merger, (3) the within-audit firm industry portfolio share, and (4) client size. Our results, if anything, become stronger for these more restricted sets of treated clients.

Second, we examine whether our documented improvement in audit quality for the treated clients is driven by audit personnel movement after the merger. We do not find that to be the case: our results continue to hold in a restricted sample in which both the engagement partner and the

[10] Following prior literature (e.g., Chin and Chi 2009), the likelihood of an accounting misstatement is based on when the misstatement occurs, not when the misstatement is later disclosed as a restatement.

review partner for a client company after the merger belong to the client's audit firm before the merger.[11]

Third, we repeat our analysis with an augmented sample that includes client companies that switched auditors after the merger, and our inferences remain unchanged. Fourth, our results also hold in a balanced panel of client companies, and a standard dynamic test shows that treated and control clients exhibit similar trends in audit quality before the merger. This evidence suggests that our results are unlikely to be driven by potential differential time trends across the treated and control clients.

As DeFond and Zhang (2014) note, an important caveat to any archival research on auditor competencies is that auditor competencies are not independent of their incentives. Greater competencies in supplying high quality audits can increase an auditor's reputation capital, which, in turn, can lead to greater incentives to deliver high quality audits. Similarly, greater incentives to deliver high quality audits can motivate auditors to develop greater competencies. Thus, the improved audit performance documented in our paper can be partly explained by enhanced auditor incentives after the merger. Disentangling the relative magnitude of the competency versus incentive effect is difficult as these two effects are intertwined. Nevertheless, it is important to ensure that our documented results are not *purely* driven by the incentive effect.

Prior research commonly focuses on auditor incentives at the audit firm level. For example, larger auditors have stronger incentives to maintain independence because of higher reputation and litigation risk. Because we include merger fixed effects in our analysis, our results cannot be driven

[11] We use the term "partner" to describe the signing auditor. The two signing auditors' signatures appear on the audit report, with the top signature from the review partner, and the bottom signature from the engagement partner. We cannot hold the audit partners constant over the event window because of mandatory partner rotation in China (Lennox, Wu and Zhang 2014). We do not impose constant personnel requirement in the main analysis because personnel movement can be viewed as one channel through which knowledge transfer occurs between the merging audit firms.

by enhanced auditor incentives common to the treatment and control groups in the same merged audit firm. It is possible that the merged audit firm has stronger incentives to improve the audit performance of the treatment group (versus the control group). If these incentives are due to anticipated or realized knowledge transfer, then our documented results reflect the joint incentive and competency effects as noted before.

To ensure that our results are not *purely* driven by the incentive effect, we conduct three additional analyses. First, we use alternative control clients that are more similar to the treated clients in terms of auditor incentives. Specifically, we include merging audit firm fixed effects (instead of merger fixed effects) in the analysis to examine across-client variation within the same merging audit firm (i.e., firm A or firm B, instead of firm AB). To further address the concern that our results are purely driven by auditor incentives to improve the audit quality of relatively weak units (regardless of their industries) within the same merging audit firm, we restrict the control group to those clients that belong to an industry whose within-audit firm portfolio share is no larger than that of the treated clients. Our inferences remain unchanged. Second, we show that the change in audit performance (as measured by client misstatements) does not occur immediately after the merger, consistent with a gradual process of knowledge transfer instead of a rapid incentive effect. Third, we find an increase in audit fees for both the treatment and control groups after the merger but the difference in fee increases between them is quite small and not statistically significant, suggesting that the audit performance improvement of the treatment group relative to the control group is unlikely to be purely driven by auditor incentives induced by differential reputation or litigation risk.

The rest of the paper is organized as follows. In Section 2, we first contextualize our study within the auditing literature and discuss its contributions; we then describe the institutional

background of China's audit market. Section 3 explains our sample and research design. Section 4 presents the main results and Section 5 provides supplemental analyses. Finally, we conclude in Section 6.

2. Related Literature and Institutional Background

2.1.Related Literature and Contribution

Our study is mainly related to four strands of literature. First, it contributes to the literature on knowledge transfer in audit firms. Prior research provides evidence that some non-audit services are associated with better audit quality, suggesting that non-audit services create knowledge spillovers and improve auditor competency and efficiency (e.g., Simunic 1984; Kinney, Palmrose and Scholz 2004; Knechel and Sharma 2012). Experimental or field research provides evidence of knowledge transfer from superiors to subordinates within an audit team (Danos, Eichenseher and Holt 1989; Bol, Estep, Moers and Peecher 2018), among peers across different teams (Kennedy, Kleinmuntz and Peecher 1997; Kadous, Leiby and Peecher 2013), and from reviewers to reviewees in the context of work paper reviews (Trotman 1985; Trotman and Yetton 1985; Ramsay 1994; Asare and McDaniel 1996). Using audit firm mergers as a shock to the channels through which knowledge transfer occurs, we provide large-sample evidence that industry-specific knowledge transfers from the more competent to the less competent units after the merger. Our archival approach complements prior studies relying on surveys, interviews or laboratory experiments (Libby, Bloomfield and Nelson 2002; Bloomfield, Nelson and Soltes 2016).

Second, our study responds to the call of DeFond and Zhang (2014, p. 278) "for more research on the role of auditors' competencies in driving audit quality." There is strong evidence that auditor industry expertise matters to audit quality, where expertise is measured at the national-

level, office-level, or partner-level. Many studies document a positive relation between national-level industry expertise and audit quality (e.g., Balsam, Krishnan and Yang 2003; Dunn and Mayhew 2004; Neal and Riley 2004; Knechel, Naiker and Pacheco 2007; Behn, Choi and Kang 2008; Lim and Tan 2008; Payne 2008). Evidence of office-level or partner-level expertise's effect on audit quality is more limited (e.g., Chin and Chi 2009; Reichelt and Wang 2010; Dekeyser, Gaeremynck and Willekens 2018). DeFond and Zhang (2014) note that national-level specialization leverages broad industry-specific knowledge and creates opportunities for knowledge sharing, while office-level or partner-level specialization hinges more on local knowledge or individual ability. Thus, we use industry market share at the national-level to measure expertise to enhance the power to detect knowledge transfer in merged audit firms.

This literature on auditor industry specialization assumes that expertise developed from auditing one client benefits audits of other clients in the same industry. We provide evidence supporting that industry-specific knowledge is transferable across personnel and clients in merged audit firms. Moreover, the endogenous matching of clients and auditors (e.g., Minutti-Meza 2013) is less of a concern in our setting (than in prior literature) because we exploit across-client variation within the same audit firm.

Third, our study contributes to the large body of research that examines the relation between auditor size and audit quality (DeAngelo 1981; Watts and Zimmerman 1986; DeFond and Zhang 2014). The majority of the literature supports the notion that larger auditors (typically captured by Big N membership) provide higher quality audits. The evidence is based on various audit quality proxies, such as material misstatements (DeFond and Jiambalvo 1991; Archambeault, Dezoort and Hermanson 2008; Lennox and Pittman 2010; Francis, Michas and Yu 2013; DeFond, Lim and Zang 2016), auditor communication (Chan and Wu 2011), financial reporting quality

(Zang 2012), perceptions of audit quality (Teoh and Wong 1993; Willenborg 1999; Weber and Willenborg 2003; DeFond and Lennox 2011; Brown, Shu, Soo and Trompeter 2013; Leone, Rice, Weber and Willenborg 2013), and audit fees (Ireland and Lennox 2002).

A few studies provide evidence that larger auditors do not provide higher quality audits. Theoretical work by Bar-Yosef and Sarath (2005) and Beyer and Sridhar (2006) demonstrates that larger auditors can provide lower quality audits. Petroni and Beasley (1996) find no evidence of audit quality difference between Big N and other auditors. Chaney, Jeter and Shivakumar (2004) show that Big N audit fee premia disappear after controlling for self-selection through the Heckman (1979) model. Lawrence, Minutti-Meza and Zhang (2011) use a propensity score matching technique and show that Big N quality differentiation is caused by differences in client characteristics.[12]

Our evidence suggests that industry-specific knowledge sharing in large audit firms enhances their competencies, which, in turn, improve their audit quality. Moreover, as noted earlier, our use of across-client variation within the same audit firm mitigates concerns about client self-selection.

Lastly, our study contributes to a recent literature on the economic determinants and consequences of audit market consolidation (e.g., Ferguson, Pinnuck and Skinner 2017; Choi, Kim and Raman 2017). Most related to our study are Chan and Wu (2011) and Gong, Li, Lin and Wu (2016) who use the same setting of audit firm mergers in China. Chan and Wu (2011) find that a merger of two audit firms licensed to audit listed clients results in higher audit quality (reflected as more modified audit opinions), but there is no audit quality improvement after a merger of a licensed audit firm with a non-licensed audit firm. Gong, Li, Lin and Wu (2016) document a

[12] These conclusions are not without controversies. See, for example, Lennox, Francis and Wang (2012), DeFond, Erkens and Zhang (2016), and Shipman, Swanquist and Whited (2017).

significant reduction in audit hours of merged audit firms. Unlike our within-audit-firm comparison, both of these studies compare the audit performance or audit effort across different audit firms. Another related study, Jiang, Wang and Wang (2018), uses the setting of Big N auditors' acquisitions of non-Big N auditors in the United States, and compares the audit quality of client companies audited by Big-N auditors (due to the acquisition) with that of client companies audited by non-Big N auditors. In contrast, our comparison is between treated and control clients in the same audit firm, and our evidence suggests that removing organizational boundaries facilitates knowledge transfer. In addition, our results are robust after removing mergers involving the international Big N.

2.2.Institutional Background

In this section, we describe the development of the audit market in China, and the economic and regulatory forces underlying the audit market consolidation over the past twenty years.

In December 1978, the Communist Party of China led by Deng Xiaoping initiated the program of economic reforms to introduce market principles to China and build "socialism with Chinese characteristics." The opening up of China to foreign investment and the restructuring of state-owned enterprises as joint stock companies generated demand for auditing. China's first audit firm was established in 1980, after which thousands of government-affiliated audit firms mushroomed (Tang 2000). The launch of the Shanghai Stock Exchange in 1990 and the Shenzhen Stock Exchange in 1991 created demand for independent audits. To audit listed companies, audit firms are required to obtain a license from the China Securities Regulatory Commission (CSRC) and the Ministry of Finance (MOF). Responding to investor demand for independent audits, the CSRC and the MOF promulgated a series of reforms to separate audit firms from the government beginning in 1998. These reforms were completed in early 2000. Since then audit firms are

independent of the government and operate under competitive market forces (Chen, Chen, Lobo and Wang 2011).

In the 1990s, most domestic audit firms were small and the audit market was highly fragmented. In 1999, the average number of listed clients for the 106 licensed audit firms was less than ten, and the market share of the 20 largest audit firms was only 49.6 percent in terms of the number of listed clients (CSRC 2001).[13] At that time, many domestic auditing professionals believed that increasing firm size through mergers could strengthen their firms' ability to compete with large international audit firms after China's entrance into the World Trade Organization (China Securities News 2000).

In the late 1990s, an increasing number of large state-owned enterprises were restructured to become joint stock companies, and the government started to impose stringent size requirements for audit firms to obtain an audit license. In 1997, to be eligible to apply for a license to audit listed companies, an audit firm needed to employ more than eight certified public accountants with a qualification from the CSRC to sign audit reports for listed companies. In June 2000, the CSRC and the MOF increased this number to 20 and further required that audit firms must have annual revenue of more than eight million yuan (the Chinese currency), which exceeded the revenue of many audit firms in 1999. Merging with another audit firm could enable small audit firms to meet these requirements.

In the 2000s, the international Big N audit firms aggressively expanded their investment in China.[14] Moreover, international audit firms (mainly the Big N) were selected as auditors for all

[13] In the early 1990s, international audit firms were not allowed to directly enter China's audit market, but they were able to form joint ventures with domestic audit firms. Since 1999, international audit firms can directly invest in and own domestic firms. The market share of the international Big N in China was only 3.6 percent in 1999, and this figure grew to 6.9 percent in 2006.

[14] For example, in 2003, Deloitte announced a landmark investment of US$150 million in China as a part of its five-year plan to increase staff and revenue by four to five times (China Securities News 2004). In 2005, Deloitte announced to acquire Beijing Tianjian, a member of the Tianjian Alliance (the biggest domestic audit alliance), and PwC

of the overseas listings of Chinese companies. To protect their domestic market share and to compete for accounting services for large Chinese companies domestically and globally, domestic audit firms had strong incentives to merge with their peers to increase firm size and competencies. Mergers among domestic audit firms were also strongly encouraged and supported by the Chinese government. In May 2007, the Chinese Institute of Certified Public Accountants (CICPA) issued a policy statement directed at developing larger and more competitive domestic audit firms. In October 2009, the State Council of China promulgated that the government would support the ten largest domestic audit firms. In November 2009, the CSRC and the MOF issued guidance for application of license to audit Chinese companies listed in Hong Kong.[15] The first batch of eligible firms consisted of the international Big 4 and eight domestic audit firms. Other audit firms could also apply for a license if they had annual revenue of more than 300 million yuan or more than 30 listed clients, and employed more than 400 certified public accountants. Merging with peer audit firms again became an efficient way to meet these license requirements.

In the early 2010s, the audit market consolidation continued and the government furthered its effort to support audit firm mergers. In June 2012, the CICPA issued another policy statement to encourage audit firms to increase their size and competencies (CICPA 2012). In particular, it promised to offer partial membership fee refunds to those audit firms who first became a top 15 firm and to those existing top 15 firms whose ranking improved by more than three positions. It explicitly encouraged audit firm mergers and required merged audit firms to achieve post-merger

announced its plan to recruit more than 1,000 workers each year in the following five years (China Financial Times 2005).

[15] These companies are referred to as H-share companies which are incorporated in mainland China and listed in Hong Kong. Many H-share companies simultaneously issue A shares traded on the Shanghai Stock Exchange or the Shenzhen Stock Exchange. Prior to 2010, H-share companies were required to prepare financial statements audited by Hong Kong auditors, and the international Big N dominated this audit market. Since 2010, the Hong Kong Exchange and Clearing Limited started to accept financial statements prepared under Chinese accounting standards and audited by mainland audit firms.

uniformity of personnel, finance, services, technology standards and information management. The CICPA was also committed to providing special training and instructions to merged audit firms with respect to unified management and quality control.

In summary, unlike the U.S. audit market, which is dominated by Big N auditors, China's audit market is relatively fragmented among domestic audit firms and the international Big N audit firms. China's rapid economic development and regulatory changes over the past twenty years triggered a wave of audit firm mergers. Domestic audit firms merged with their peers to increase firm size and to deliver audits demanded by clients in a competitive audit market.[16] Merged audit firms have strong economic incentives to improve their competence to obtain government support and to compete in the audit market. Using this setting, we study whether removing organizational boundaries facilitates knowledge transfer between the merging audit firms.

3. Research Methods

3.1.Sample and Data

We collect data on audit firm mergers from the CICPA, audit firms' official websites, and leading financial newspapers. We obtain client companies' financial statement data and audit opinion data from the China Stock Market and Accounting Research (CSMAR) database. We collect restatement data from the "Material Accounting Errors" section of financial statement footnotes and exclude restatements due to changes in accounting standards or tax rules, mergers and acquisitions, or other issues unrelated to accounting irregularities. We collect the names of the

[16] Besides the aforementioned economic and regulatory forces, three factors underlie auditors' incentives to provide high quality audits in China (Lennox, Wu and Zhang 2016). First, auditors' legal responsibilities and litigation risk were substantially increased by legal reforms in 2002 and 2005 (Firth, Mo and Wong 2012). Second, audit firms are overseen by the MOF and the CICPA, and regularly inspected by the Inspection Bureau of the MOF. For example, in 2005, the licenses of 18 audit firms were withdrawn by the regulators and a further 60 audit firms were punished with fines and reform orders. Third, audit scandals can result in adverse reputational consequences (He, Pittman and Rui 2016).

engagement and review partners from annual reports, and obtain data on their employment history from the auditor resumes provided by the CSRC.

Our sample consists of 46 mergers over the period 1998–2013, in which both merging audit firms had a license to audit listed companies in China.[17] Our sample includes listed client companies over the period 1995–2016 since we use three-year data before and after the merger when available. The sample consists of client companies that are audited by (1) one of the merging audit firms before the merger and (2) the merged audit firm after the merger.[18]

Panel A of Table 1 lists the 46 audit firm mergers by year. Seventeen mergers occurred in 2000, the year in which the CSRC and the MOF issued new regulations that imposed size requirements (with respect to the number of CPAs and total revenue) for audit firms to obtain or retain their license to audit listed companies. The number of mergers in other years ranges from zero to six. Panel B of Table 1 presents the sample breakdown by industry. The whole sample consists of 9,795 client-year observations (1,899 unique clients), 18% of which (i.e., 1,766 observations of 357 unique clients) belong to the treatment group (defined below). The Machinery, Equipment, and Instrument industry includes the largest number of client-year observations, accounting for 15.72% of our sample, followed by the Petroleum, Chemical, Plastics, and Rubber industry (9.15%), and the Metal and Non-Metal industry (7.86%). The number (percentage) of the treatment observations in these three industries is 348 (22.6%), 199 (22.2%), and 181 (23.5%) respectively.

[17] Our inferences are unchanged after we drop three mergers involving the international Big N (see the Online Appendix).

[18] In the case where firm A merges with firm B to form firm AB, A and B are the merging audit firms, and AB is the merged audit firm. We only require a client company be audited by either A or B in the year before the merger and by AB in the year after the merger, and do not impose this requirement over the whole seven-year window (because doing so severely reduces the number of observations). In a supplemental analysis, we repeat our tests in a constant sample of clients over a five-year window around the merger to ensure that our results hold in a balanced panel.

3.2.Research Design

We employ a difference-in-difference approach and examine whether the audit quality for the treatment group improves after the merger, relative to that for the control group. Specifically, we estimate the following logistic model of audit quality (*AQ*):

$$AQ_{ijt} = \alpha_j + \beta_1 \times POST_{ijt} + \beta_2 \times TREAT_{ijt} + \beta_3 \times POST_{ijt} \times TREAT_{ijt} + Controls + \varepsilon_{ijt}, \quad (1)$$

where *i* indexes client companies, *j* indexes audit firm mergers, and *t* indexes event time (the year of merger is year 0). Our empirical tests focus on the within-merged-firm variation by including merger fixed effects α_j. This design allows us to exploit across-client variation while removing all effects at the merged audit firm level. We use two audit quality measures as the dependent variable, misstatements (*MISSTATEMENT*) and modified audit opinion (*MAO*). These two measures have relatively low measurement error and offer relatively strong evidence of poor audit quality (DeFond and Zhang 2014). $MISSTATEMENT_{ijt}$ equals one if client *i*'s financial statement in year *t* is restated in a subsequent year due to accounting irregularities, and zero otherwise. MAO_{ijt} equals one if client *i* receives a modified audit opinion in year *t*, and zero otherwise. Following Wang, Wong and Xia (2008), we classify unqualified opinions with an explanatory paragraph, qualified opinions, disclaimers, and adverse opinions as modified opinions. Unlike going-concern opinions only issued to financially distressed clients in the United States, modified opinions in China are sometimes issued to profitable clients with questionable accounting practices (Chen, Chen and Su 2001). This feature of modified opinions enables us to capture the effect of knowledge transfer on audit quality for a wide spectrum of client companies.

For each merger, we include three-year client-level data before and after the merger when available. Data in the merger year is also included since it is the first year in which audit reports

are issued in the name of the merged audit firm.[19] $POST_{ijt}$ equals one if client *i*'s year *t* observation belongs to the post-merger period (including the merger year), and zero if client *i*'s year *t* observation belongs to the pre-merger period.

We sort all client companies of each merged audit firm into the treatment and control groups based on the relative industry expertise of their auditors in the year before the merger. Following prior literature (e.g., Balsam, Krishnan, and Yang 2003; Chin and Chi 2009), an audit firm's industry expertise is measured by its industry market share (based on the number of listed clients in that industry).[20] For clients in an industry audited by both merging audit firms, those audited by the less competent audit firm in that industry belong to the treatment group.[21] All other clients belong to the control group. $TREAT_{ijt}$ equals one if client *i* in merger *j* belongs to the treatment group, and zero if client *i* in merger *j* belongs to the control group.

Our variable of interest is the interaction term $POST_{ijt} \times TREAT_{ijt}$. Its coefficient β_3 captures the change in audit quality for the treatment group relative to the control group. An improvement in audit quality for the treatment group will be reflected in a negative β_3 when the dependent variable is *MISSTATEMENT*, and a positive β_3 when the dependent variable is *MAO*. Because we include merger fixed effects in the regression, we essentially compare the treatment group and the control group within the same merged audit firm. This design feature allows us to remove all common effects at the merged audit firm level, and use the treatment effect to capture industry-specific knowledge transfer after the merger.

[19] Removing observations in the merger event year does not change our inferences (see the Online Appendix).
[20] Our results become stronger when we take into account client size in defining an audit firm's industry expertise (see Section 5.1).
[21] As noted earlier, one merging audit firm can be more competent in one industry while less competent in another industry than the other merging audit firm.

We include a set of control variables following prior research on misstatements and auditors' reporting decisions. Detailed definitions of these variables appear in the Appendix. We control for client size (*SIZE*), leverage (*LEV*), profitability (*ROA*), the incurrence of loss (*LOSS*), and sales growth (*GROWTH*), which are associated with the incidence of misstatements and audit risk (Kinney and McDaniel 1989; DeFond and Jiambalvo 1994). A client's current ratio (*CURRENT*) is included as a control since a higher current ratio indicates a lower degree of audit risk (Chan and Wu 2011). We control for firm age (*AGE*) as old firms in China, after exhausting their IPO proceeds, are more likely to suffer financial distress (DeFond, Wong, and Li 2000). Audit firm tenure (*TENURE*) is also included as a control as in prior studies (Chan and Wu 2011). Following Gong, Li, Lin and Wu (2016), we control for audit opinions (*MAO*) when the dependent variable is *MISSTATEMENT*.[22] Finally, we include industry fixed effects in all regressions.[23] Standard errors are clustered by client.

3.3.Summary Statistics

Table 2 presents the summary statistics of all the variables used in the main analysis. All continuous variables are winsorized at the top and bottom one percent to mitigate the influence of extreme values. Misstatements happen for 6.93 percent of all the client-year observations, and 6.66 percent of observations receive a modified audit opinion. The relatively low frequency of these two outcomes are consistent with prior research (He, Kothari, Xiao and Zuo 2018). 57 percent of observations belong to the post-merger period, and 18 percent of observations belong to the treatment group. The variable *SIZE* is right-skewed, with a mean of 5360.5 million yuan, and a

[22] Our inferences are unchanged when we drop *MAO* as a control.

[23] As noted before, the inclusion of merger fixed effects allows us to compare the treatment and control groups within each merged audit firm. We do not further include client or year fixed effects due to the low frequency nature of misstatements or modified audit opinions and the limited time-series and cross-sectional data for each merger. Our inferences are unchanged when we repeat the analysis with a logistic model in which we control for merger×industry fixed effects (see the Online Appendix).

median of 2045.6 million yuan. The mean and median of *LEV* is both around 47 percent, and the mean and median of *ROA* is both around 3.6 percent. 10.4 percent of observations report negative net income. Sales growth exhibits a large variation, with a mean of 19.6 percent, and a standard deviation of 50 percent. Both the mean and median of the current ratio (2 and 1.4 respectively) exceed the common benchmark value of one. An average client has been listed for 9 years. The mean and median tenure for the incumbent audit firm is 6.5 and 5 years respectively.

4. Main Results

The existence of knowledge transfer in audit firms suggests that the audit quality of a less competent auditor (in terms of industry expertise) improves after merger with a more competent auditor. We test this prediction using two proxies for audit quality: the likelihood of clients' earnings misstatements (Table 3) and auditors' proclivity to issue modified audit opinions (Table 4).

4.1.Results on Misstatements

Panel A of Table 3 reports the descriptive statistics of *MISSTATEMENT*. For the treatment group, the misstatement frequency is 9.10 percent before the merger, and 4.95 percent after the merger, and the reduction of 4.15 percent is statistically significant (p-value<0.001). The misstatement frequency also decreases for the control group after the merger, though both the economic and statistical magnitude are much smaller (1 percent with p-value=0.083). The difference in misstatement reduction between the treatment and control groups is 3.16 percent and statistically significant (p-value=0.020).

Panel B of Table 3 presents the logistic regression results of using *MISSTATEMENT* as the dependent variable in Equation (1). Column 1 reports the results of estimating Equation (1) without time-varying control variables. The coefficient on the interaction term *POST*×*TREAT* is -0.4475

and statistically significant at the five percent level (z-stat=-2.05). The magnitude and statistical significance of this coefficient become slightly larger (-0.4898 with z-stat=-2.25) in column 2 when the full set of control variables is included in the estimation. The positive, significant coefficient on *TREAT* suggests that the audit quality for the treated clients before the merger is on average lower than that for the control clients.[24] The behavior of the control variables is generally as predicted. Firms with high leverage and low profitability are more likely to restate their current period earnings. Firms that receive a modified audit opinion are also more likely to exhibit accounting irregularities.

The economic magnitude of the results is gauged from the incremental effect of *POST×TREAT* on the likelihood of an earnings misstatement (Puhani 2012).[25] Based on the coefficient estimates in column 2, the average marginal effect of *POST×TREAT* is 2.83 percent, which is more than one third of the sample mean of *MISSTATEMENT* (6.93 percent). Hence, we find an economically significant reduction in misstatements for the treated clients relative to the control clients after the merger. These results suggest industry-specific knowledge transfer after the merger, which is manifested through changes in audit performance as measured by the probability of misstatements.

4.2.Results on Audit Opinion

In the above analysis, we assess audit quality based on whether audited financial statements contain material misstatements which are later restated. In this section, we use auditors' reporting outcomes to assess audit quality.

[24] The difference-in-difference approach does not require the level of the dependent variable to be identical between the treatment and control groups as any systematic difference between them will be eliminated in the estimation.

[25] Ai and Norton (2003) point out that in non-linear models the coefficient on the interaction term does not capture the marginal effect. However, Puhani (2012) demonstrates that this critique does not apply in a difference-in-differences model. Our inferences are unchanged when we repeat the analysis with a linear probability model (see the Online Appendix).

Panel A of Table 4 reports the descriptive statistics of *MAO*. For the treatment group, the frequency of modified audit opinions is 5.98 percent before the merger, and 8.16 percent after the merger, and the increase of 2.18 percent is statistically significant (*p*-value=0.082). The frequency of modified audit opinions decreases slightly for the control group after the merger (-0.84 percent with *p*-value=0.132). The difference in differences between the treatment and control groups is 3.02 percent and statistically significant (*p*-value=0.023).

Panel B of Table 4 presents the logistic regression results of using *MAO* as the dependent variable in Equation (1). Column 1 reports the results of estimating Equation (1) without time-varying control variables. The coefficient on the interaction term *POST*×*TREAT* is 0.5891 and statistically significant at the one percent level (*z*-stat=2.66). The magnitude of this coefficient becomes slightly larger (0.7126 with *z*-stat=2.49) in column 2 when the full set of control variables is included in the estimation. The behavior of the control variables is generally as predicted. Small, old firms with high leverage, low profitability, frequent losses and low growth are more likely to receive a modified audit opinion.[26]

The economic magnitude of the results is gauged from the incremental effect of *POST*×*TREAT* on the likelihood of issuing a modified audit opinion. Based on the coefficient estimates in column 2, the average marginal effect of *POST*×*TREAT* is 2.81 percent, which is more than one third of the sample mean of *MAO* (6.66 percent). Hence, we find an economically significant increase in modified audit opinions for the treated clients relative to the control clients after the merger. These results suggest industry-specific knowledge transfer after the merger, which is manifested through changes in audit performance as measured by the likelihood of issuing a modified audit opinion.

[26] The positive coefficient on the current ratio (*CURRENT*) is somewhat surprising and might be explained by the higher audit risk associated with a larger amount of accounts receivable and inventory.

5. Supplementary Analyses

In this section, we conduct a series of additional analyses. First, we use four alternative definitions of treated clients. Second, we repeat our analysis for a restricted sample in which both the engagement partner and the review partner for a client company after the merger belong to the client's audit firm before the merger. Third, we use an augmented sample including client companies that switched auditors after the merger. Fourth, we repeat our analysis in a balanced panel of client companies and perform a standard dynamic test to test for possible pre-trends. Lastly, we conduct three analyses to further ensure that our results are not *purely* driven by the incentive effect.

5.1.Alternative Definitions of Treated Clients

In the baseline specification (reported in Table 3 and Table 4), for each merger, we sort all client companies into the treatment and control groups based on the relative industry expertise of their auditors in the year before the merger, where industry expertise is based the auditor's industry market share. For client companies in an industry audited by both merging audit firms, those audited by the less competent audit firm in that industry belong to the treatment group, while all other client companies belong to the control group.

In this section, we impose more stringent requirements on client companies to be classified as treatment firms. Specifically, $TREAT_1$ equals one when (1) *TREAT* equals one, and (2) the more competent auditor in the merger is an industry expert (i.e., ranked as a top five auditor in terms of industry market share). $TREAT_2$ equals one when (1) *TREAT* equals one, and (2) the distance of the industry market share rank between the two audit firms is at least five. $TREAT_3$ equals one when (1) *TREAT* equals one, and (2) the within-audit firm industry portfolio share is larger than that of the other audit firm, where the industry portfolio share is computed as the number of listed

clients in that particular industry divided by the total number of clients. $TREAT_4$ equals one when (1) *TREAT* equals one, and (2) the total assets of clients in that particular industry audited by the audit firm are larger than those of the other audit firm. We expect the effect of knowledge transfer on audit performance to be stronger for these more restricted sets of client companies.

Table 5 presents the regression results with these alternative definitions of treated clients. Panel A presents the logistic regression results of using *MISSTATEMENT* as the dependent variable. Panel B presents the logistic regression results of using *MAO* as the dependent variable. The full set of control variables (as in Table 3 or 4) are included but not reported for brevity. Across all columns in both panels, the coefficient on the interaction term *POST×TREAT* remains statistically significant. In addition, the magnitude of the coefficient on this interaction term in all specifications is larger than that reported in Table 3 (for *MISSTATMENT*) or Table 4 (for *MAO*), consistent with a stronger effect of knowledge transfer for these more restricted sets of client companies.

5.2.Restricted Sample without Audit Personnel Movement

In our previous analysis, our sample consists of client companies that are audited by (1) one of the merging audit firms before the merger and (2) the merged audit firm after the merger. Our analysis relies on audit team heterogeneity generated by a merger of two audit firms with different levels of expertise in a particular industry. This heterogeneity allows us to test whether industry-specific knowledge transfers from the more competent to the less competent audit teams after the merger, as manifested through changes in audit performance.

Audit personnel movement between the merging audit firms after the merger can partly contribute to the observed changes in audit performance. To ensure that our results are not entirely driven by this effect, we repeat our analysis for a restricted sample in which both the engagement

partner and the review partner for a client company after the merger belong to the client's audit firm before the merger. We manually verify each partner's employment history from the auditor resumes provided by the CSRC. Table 6 presents the regression results for this restricted sample. Consistent with our previous results, the coefficient on the interaction term *POST×TREAT* is negative and significant in column 1 when the dependent variable is *MISSTATEMENT*, and positive and significant in column 2 when the dependent variable is *MAO*. These results indicate that our documented improvement in audit quality for the treated clients (relative to the control clients) after the merger are unlikely to be entirely driven by audit personnel movement.

5.3.Augmented Sample including Dropped Clients

Our sample only includes client companies of the merging audit firms that remain audited by the merged audit firm after the merger. Clients that switch to other auditors after the merger are not included as knowledge transfer between the merging audit firms would have no effect on the audit quality of those clients. For the 46 mergers included in our sample, the total number of client companies is 2,211 before the merger, and 1,899 after the merger. Thus, a relatively small number of client companies (i.e., 14.1 percent) switched auditors after the merger. Based on the industry market shares of the auditors before the merger, a similar percentage of client companies in the treatment and control groups are dropped from the sample due to switching auditors (i.e., 15.8 percent and 13.7 percent respectively).[27]

We repeat our analysis with an augmented sample that includes client companies that switched audit firms after the merger. We create two dummy variables to indicate dropped client companies. *TREAT_DROP* is a dummy variable that equals one for dropped client companies that

[27] Had no client companies switched auditors, the treatment group would have included 424 client companies, and the control group would have included 1,787 client companies. In the actual sample, the treatment group consists of 357 client companies, and the control group consists of 1,542 client companies.

would have been classified as a treatment firm, and *CONTROL_DROP* is a dummy variable that equals one for dropped client companies that would have been classified as a control firm. We include in the baseline regression these two dummy variables and their interactions with *POST* (i.e., *POST*×*TREAT_DROP* and *POST*×*CONTROL_DROP*). The augmented sample is essentially divided into four groups: treated clients, control clients, dropped treatment clients, and dropped control clients. In the regression model, control clients are used as the benchmark group. Table 7 presents the logistic regression results. The results show that dropped treatment and control clients both exhibit higher misstatement frequencies than the control clients before the merger. After the merger, the misstatement frequency for the dropped treatment clients does not change, but the misstatement frequency for the dropped control clients reduces. More importantly, the coefficient on the interaction term *POST*×*TREAT* remains negative and significant in column 1 when the dependent variable is *MISSTATEMENT*, and positive and significant in column 2 when the dependent variable is *MAO*. Hence, our results continue to hold in this augmented sample that includes dropped clients.

5.4.Constant Sample and Pre-Trends

Our sample consists of client-year observations in the seven-year window around the audit firm merger. To be included in our sample, a client company needs to be audited by one of the merging audit firms in the year before the merger and by the merged audit firm in the year after the merger. However, we do not require a constant sample of client companies over the seven-year window because doing so severely reduces the number of observations and weakens the power of our tests. To ensure the robustness of our results in a balanced panel, we repeat our main analysis in a constant sample of client companies over a five-year window around the audit firm merger. Column 1 of Table 8 presents the logistic regression results of using *MISSTATEMENT* as the

dependent variable. Column 2 of Table 8 presents the logistic regression results of using *MAO* as the dependent variable. As expected, the coefficient on the interaction term *POST×TREAT* is negative and significant in column 1, and positive and significant in column 2.

In addition, to ensure that the coefficient on the interaction term *POST×TREAT* reflects the treatment effect instead of a differential time trend between the treatment and control groups, we perform a standard dynamic test to test for possible pre-trends. Specifically, we create a dummy variable (*BEFORE_1YR*) that equals one for observations in the year before the merger (i.e., Year –1), and include in the baseline regression this dummy variable and its interaction with *TREAT*. Columns 3 and 4 of Table 8 present the logistic regression results. The coefficient on the interaction term *BEFORE_1YR×TREAT* is statistically insignificant in both columns (*z*-stat=-0.76 in column 3 and *z*-stat=0.85 in column 4). These results of similar trends in audit quality across different client companies before the audit firm merger suggest that our inferences of knowledge transfer are unlikely driven by potential differential time trends absent the audit firm merger.

5.5.The Incentive Effect

In our main analysis, we classify all client companies in a merged audit firm into the treatment and control groups based on their auditors' industry expertise before the merger. Based on this classification, we interpret the audit quality improvement for the treatment group relative to the control group after the merger as evidence of knowledge transfer. We acknowledge that the improved audit performance for the treatment group (relative to the control group) after the merger can be partly explained by enhanced auditor incentives after the merger. This caveat is not unique to our study and applies to any archival research on auditor competencies because of the interrelation between auditor competencies and their incentives (DeFond and Zhang 2014). To ensure that our results are not *purely* driven by the incentive effect, we conduct three additional

analyses. First, we use alternative control clients that are more similar to the treated clients in terms of auditor incentives. Second, we investigate the timing of the audit performance improvement. Third, we look at audit fees.

5.5.1. Alternative Control Clients

In our main analysis, the control group includes all client companies that are not classified as the treatment group. In our simple example that firm A (a specialist in the mining industry) merges with firm B (a non-specialist with clients in the mining industry), firm B's clients in the mining industry belong to the treatment group, while all other clients of either firm A or firm B belong to the control group. It could be the case that the audit quality for firm B's clients is generally lower than that for firm A's clients, and the merged audit firm AB has stronger incentives to improve the audit quality for firm B's clients regardless of their industries. To address this concern, we include merging audit firm fixed effects (instead of merger fixed effects) in the analysis to examine across-client variation within the same merging audit firm (i.e., firm A or firm B, instead of firm AB). Columns 1 and 2 of Table 9 present the regression results for this alternative specification.[28] Consistent with our main analysis, the coefficient on the interaction term *POST×TREAT* is negative and significant for *MISSTATEMENT*, and positive and significant for *MAO*.

Further, to address the concern that our results are purely driven by auditor incentives to improve the audit quality of relatively weak units (regardless of their industries) within the same merging audit firm, we restrict the control group to those clients that belong to an industry whose within-audit firm portfolio share is no larger than that of the treated clients. For example, in a situation where audit firm B has three treated clients in the mining industry, two control clients in

[28] The number of observations is slightly reduced in this analysis compared with Table 3 or 4 because the value of the dependent variable is all zero for some merging audit firms.

the entertainment industry, and six control clients in the electronics industry, we remove from the control group those clients in the electronics industry. Columns 3 and 4 of Table 9 present the regression results for the analysis with this more restricted control group. Similar to the results reported in columns 1 and 2, our inferences on knowledge transfer remain intact.

5.5.2. Alternative Definition of the POST Variable

In the main analysis, the merger year is included as a post-merger year (i.e., *POST*=1) since it is the first year in which audit reports are issued in the name of the merged audit firm. If our results were purely driven by the incentive effect, the improvement in audit performance for the treatment group (relative to the control group) would occur immediately after the merger (i.e., in the merger year and the three-year period after the merger). We create two dummy variables and use their interactions with *TREAT* to test this prediction: *POST*_0 equals one if the client observation belongs to the merger event year, and *POST*_13 equals one if the client observation belongs to the three-year period after the merger event year. Table 10 reports the results and shows that the effect of audit firm mergers on audit performance (as measured by *MISSTATEMENT*) does not occur in the merger event year and only happens in the three-year period after the merger. This evidence suggests again that our results are unlikely to be entirely driven by the incentive effect.

5.5.3. Audit Fees

The change in audit performance of the treatment group relative to the control group documented in the main analysis reflects a benefit of industry-specific knowledge transfer after the merger. The net effect of knowledge transfer on audit fees is unclear because knowledge transfer can entail both additional costs (e.g., integration costs related to information systems or training) and efficiency gains (e.g., reduction in audit hours). However, if previously documented results are totally driven by auditors' stronger incentives to maintain independence because of

higher reputation and litigation risk for the treatment group, audit fees should increase more for the treatment group relative to the control group after the merger. Thus, we test whether the change in the audit fee differs between the treated clients and the control clients. For this analysis, the sample is restricted to mergers over the period 2001 to 2013 because client companies started to disclose audit fees in 2000.

Panel A of Table 11 reports the descriptive statistics of audit fee (*FEE*). For the treatment group, the average audit fee is ¥596,100 before the merger, and ¥760,800 after the merger, and the increase of ¥164,700 is statistically significant (p-value<0.001). The average audit fee also increases for the control group after the merger (¥184,500 with p-value<0.001). The difference in audit fee increase between the treatment and control groups is quite small (¥19,730) and not statistically significant (p-value=0.597).

Panel B of Table 11 presents the OLS regression results of using the natural logarithm of the audit fee (*FEE*) as the dependent variable. Column 1 reports the results without time-varying control variables. The coefficient on the interaction term *POST*×*TREAT* is 0.0061 and not statistically significant (t-stat=0.23). It remains small and statistically insignificant (-0.0131 with t-stat=-0.62) in column 2 when the full set of control variables is included in the estimation. These results suggest that the audit performance improvement of the treatment group relative to the control group is unlikely to be purely driven by auditor incentives induced by differential reputation or litigation risk.

6. Conclusions

In this paper, we study knowledge transfer in audit firms by utilizing the setting of the rapid audit market consolidation in China over the past twenty years. For each merger, we sort all client companies into the treatment and control groups based on the relative industry expertise of their

auditors before the merger. We employ a difference-in-difference approach and examine whether the audit quality for the treatment group improves after the merger (three-year post-merger versus three-year pre-merger), relative to that for the control group. Our empirical tests exploit across-client variation while removing all effects at the merged audit firm level by including merger fixed effects. We find an economically significant improvement in audit quality (as reflected in a reduction in misstatements and an increase in modified audit opinions) for the treatment group relative to the control group in the same merged audit firm. The evidence is consistent with the existence of knowledge transfer in audit firms.

We caution the reader that the audit market in China may be quite different from those in other countries. The economic and regulatory forces underlying China's audit market consolidation may be unique and our documented evidence of knowledge transfer may hinge critically on these forces. Thus, removing organizational boundaries may not necessarily lead to knowledge transfer between the merging audit firms in a different economic and regulatory environment. Assessing the generalizability of our findings with an alternative audit market setting in other countries is left for future research.

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APPENDIX: Variable Definitions

Variable	Variable Definition
Dependent Variables:	
MISSTATEMENT	Equals one if the client's financial statement in the current year is restated in a subsequent year due to accounting irregularities, and zero otherwise. We manually collect restatement data from the "Material Accounting Errors" section of financial statement footnotes and exclude restatements due to changes in accounting standards or tax rules, mergers and acquisitions, or other issues unrelated to accounting irregularities.
MAO	Equals one if the client receives a modified audit opinion in the current year, and zero otherwise. Following Wang, Wong and Xia (2008), we classify unqualified opinions with an explanatory paragraph, qualified opinions, disclaimers, and adverse opinions as modified opinions.
FEE	The audit fee paid by the client in the current year.
Independent Variables:	
POST	Equals one if the client observation belongs to the post-merger period, and zero otherwise.
TREAT	Equals one if the client belongs to the treatment group. For each merger, we sort all client companies into the treatment and control groups based on the relative industry expertise of their auditors in the year before the merger, where industry expertise is based the auditor's industry market share. For client companies in an industry audited by both merging audit firms, those audited by the less competent audit firm in that industry belong to the treatment group. All other client companies belong to the control group.
$TREAT_1$	Equals one when (1) *TREAT* equals one, and (2) the more competent auditor in the merger is an industry expert (i.e., ranked as a top five auditor in terms of industry market share).
$TREAT_2$	Equals one when (1) *TREAT* equals one, and (2) the distance of the industry market share rank between the two audit firms is at least five.
$TREAT_3$	Equals one when (1) *TREAT* equals one, and (2) the within-audit firm industry portfolio share is larger than that of the other audit firm, where the industry portfolio share is computed as the number of listed clients in that particular industry divided by the total number of clients.
$TREAT_4$	Equals one when (1) *TREAT* equals one, and (2) the total client assets of the more competent auditor in that particular industry are larger than those of the less competent auditor.
TREAT_DROP	Equals one for dropped client companies that would have been classified as a treatment firm, and zero otherwise.
CONTROL_DROP	Equals one for dropped client companies that would have been classified as a control firm, and zero otherwise.
BEFORE_1YR	Equals one for observations in the year before the merger (i.e., Year –1), and zero otherwise.
POST_0	Equals one if the client observation belongs to the merger event year, and zero otherwise.
POST_13	Equals one if the client observation belongs to the three-year period after the merger event year, and zero otherwise.
SIZE	The client's total assets in the current year.
LEV	Leverage ratio in the current year, computed as total liabilities divided by total assets.
ROA	Return on assets in the current year, computed as net income divided by total assets.
LOSS	Equals one if the client reports negative net income in the current year, and zero otherwise.
GROWTH	Sales growth, computed as the percentage change in sales from the prior year to the current year.
CURRENT	Current ratio in the current year, computed as current assets divided by current

	liabilities.
AGE	The number of years that the client has been listed.
TENURE	The number of continuous years that the client has been audited by the audit firm.

TABLE 1: Sample Distribution

Panel A: Number of Mergers by Year

Year	1998	1999	2000	2001	2002	2003	2004	2005	2006
N	2	0	17	1	1	1	0	1	2
Year	2007	2008	2009	2010	2011	2012	2013		Total
N	3	6	5	1	1	3	2		46

Panel B: Number of Client-Year Observations by Industry

Industry	Full Sample		Treatment Sample	
	N	Percentage (Column)	N	Percentage (Row)
Machinery, Equipment, and Instrument	1540	15.72%	348	22.60%
Petroleum, Chemical, Plastics, and Rubber	896	9.15%	199	22.21%
Metal and Non-Metal	770	7.86%	181	23.51%
Wholesale and Retail Trade	704	7.19%	115	16.34%
Medicine and Biological Products	693	7.08%	160	23.09%
Real Estate	688	7.02%	128	18.60%
IT and Computing	585	5.97%	93	15.90%
Electronics	520	5.31%	136	26.15%
Food and Beverage	454	4.64%	79	17.40%
Energy and Water	421	4.30%	45	10.69%
Transportation	398	4.06%	40	10.05%
Conglomerates	347	3.54%	50	14.41%
Textile, Apparel, Fur and Leather	308	3.14%	24	7.79%
Public Utilities	293	2.99%	53	18.09%
Mining	265	2.71%	51	19.25%
Agriculture	229	2.34%	19	8.30%
Construction	211	2.15%	10	4.74%
Paper and Printing	208	2.12%	10	4.81%
Entertainment	137	1.40%	10	7.30%
Other Manufacturing	128	1.31%	15	11.72%
Total	9795	100.0%	1766	18.03%

Notes: Our sample consists of 46 mergers over the period 1998–2013, in which both merging audit firms had a license to audit listed companies in China. Our sample includes client companies over the period 1995–2016 since we use three-year data before and after the merger when available. Our sample focuses on client companies that are audited by (1) one of the merging audit firms before the merger and (2) the merged audit firm after the merger. For each merger, we sort all client companies into the treatment and control groups based on the relative industry expertise of their auditors in the year before the merger, where industry expertise is based on the auditor's industry market share. For client companies in an industry audited by both merging audit firms, those audited by the less competent audit firm in that industry belong to the treatment group. All other client companies belong to the control group.

TABLE 2: Summary Statistics

Variables	Mean	Std. Dev.	Q1	Median	Q3
MISSTATEMENT	0.0693	0.2540	0.0000	0.0000	0.0000
MAO	0.0666	0.2493	0.0000	0.0000	0.0000
POST	0.5721	0.4948	0.0000	1.0000	1.0000
TREAT	0.1803	0.3845	0.0000	0.0000	0.0000
SIZE (¥m)	5360.5	11171.9	1023.9	2045.6	4729.1
LEV	0.4785	0.2372	0.3143	0.4743	0.6293
ROA	0.0363	0.0712	0.0130	0.0367	0.0660
LOSS	0.1042	0.3056	0.0000	0.0000	0.0000
GROWTH	0.1963	0.4979	-0.0242	0.1267	0.3023
CURRENT	2.0436	2.3432	0.9784	1.3828	2.1603
AGE	9.2178	5.3722	5.0000	9.0000	13.000
TENURE	6.5166	4.2926	3.0000	5.0000	9.0000

Notes: This table presents the summary statistics of the variables. All continuous variables are winsorized at the top and bottom one percent to mitigate the influence of extreme values. Details on the definition and construction of the variables reported in the table are available in the Appendix.

TABLE 3: Knowledge Transfer and Accounting Misstatements

Panel A: Descriptive Statistics of *MISSTATEMENT*				
	TREAT=1		*TREAT*=0	
	N	Percentage	N	Percentage
Pre-Merger	736	9.10%	3455	7.55%
Post-Merger	1030	4.95%	4574	6.56%
Difference		-4.15%		-1.00%
[*p*-value]		[*p*<0.001]		[*p*=0.083]
Difference-in-Differences		-3.16%		
[*p*-value]		[*p*=0.020]		

Panel B: Models of *MISSTATEMENT*		
Dependent Variable: *MISSTATEMENT*	(1)	(2)
POST	0.0297	-0.0511
	(0.34)	(-0.49)
TREAT	0.3680*	0.4098**
	(1.85)	(2.08)
POST×TREAT	**-0.4475****	**-0.4898****
	(-2.05)	**(-2.25)**
SIZE		0.0323
		(0.50)
LEV		0.6314**
		(2.09)
ROA		-1.6259*
		(-1.74)
LOSS		0.1496
		(0.80)
GROWTH		-0.0470
		(-0.46)
CURRENT		0.0356
		(1.13)
AGE		0.0772
		(0.55)
TENURE		-0.0004
		(-0.00)
MAO		0.5849***
		(3.13)
Merger Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes
N	9795	9795
Pseudo R^2	0.1241	0.1451

Notes: Panel A reports the descriptive statistics of *MISSTATEMENT*. The *p*-values of mean differences are reported in brackets. Panel B presents the logistic regression results of using *MISSTATEMENT* as the dependent variable. Details on the definition and construction of the variables reported in the table are available in the

Appendix. For *SIZE, AGE* and *TENURE,* log-transformed values are used in the regressions. *z*-statistics shown in parentheses are adjusted for clustering by client. *, **, *** indicate significance at the 10%, 5%, and 1% levels (two-tailed), respectively.

TABLE 4: Knowledge Transfer and Audit Opinions

Panel A: Descriptive Statistics of *MAO*

	TREAT=1		*TREAT*=0	
	N	Percentage	N	Percentage
Pre-Merger	736	5.98%	3455	7.00%
Post-Merger	1030	8.16%	4574	6.17%
Difference		2.18%		-0.84%
[*p*-value]		[*p*=0.082]		[*p*=0.132]
Difference-in-Differences		3.02%		
[*p*-value]		[*p*=0.023]		

Panel B: Models of *MAO*

Dependent Variable: *MAO*	(1)	(2)
POST	-0.0196	-0.0505
	(-0.22)	(-0.38)
TREAT	-0.0761	-0.1213
	(-0.33)	(-0.46)
POST×TREAT	**0.5891*****	**0.7126****
	(2.66)	**(2.49)**
SIZE		-0.7936***
		(-8.51)
LEV		4.7440***
		(10.47)
ROA		-3.4275***
		(-3.16)
LOSS		0.9315***
		(5.17)
GROWTH		-0.3357**
		(-2.20)
CURRENT		0.1062**
		(2.50)
AGE		0.7120***
		(3.84)
TENURE		-0.2169
		(-1.58)
Merger Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes
N	9795	9795
Pseudo R^2	0.0884	0.3966

Notes: Panel A reports the descriptive statistics of *MAO*. The *p*-values of mean differences are reported in brackets. Panel B presents the logistic regression results of using *MAO* as the dependent variable. Details on the definition and construction of the variables reported in the table are available in the Appendix. For *SIZE, AGE* and *TENURE,* log-transformed values are used in the regressions. *z*-statistics shown in parentheses are adjusted for clustering by client. *, **, *** indicate significance at the 10%, 5%, and 1% levels (two-tailed), respectively.

TABLE 5: Alternative Definitions of Treated Clients

Panel A: Models of *MISSTATEMENT*				
	(1)	(2)	(3)	(4)
	TREAT=*TREAT*$_1$	*TREAT*=*TREAT*$_2$	*TREAT*=*TREAT*$_3$	*TREAT*=*TREAT*$_4$
POST	-0.0851	-0.0514	-0.0481	-0.0609
	(-0.85)	(-0.50)	(-0.47)	(-0.59)
TREAT	0.6252**	0.5385**	0.5229**	0.6939***
	(2.20)	(2.54)	(2.34)	(3.31)
POST×TREAT	**-0.6642****	**-0.6718*****	**-0.7153*****	**-0.5969*****
	(-2.18)	**(-2.71)**	**(-2.89)**	**(-2.58)**
Controls	Yes	Yes	Yes	Yes
Merger Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
N	9795	9795	9795	9795
Pseudo R^2	0.1452	0.1457	0.1457	0.1468
Panel B: Models of *MAO*				
	(1)	(2)	(3)	(4)
	TREAT=*TREAT*$_1$	*TREAT*=*TREAT*$_2$	*TREAT*=*TREAT*$_3$	*TREAT*=*TREAT*$_4$
POST	0.0118	0.0031	-0.0133	-0.0368
	(0.09)	(0.03)	(-0.10)	(-0.29)
TREAT	-0.3943	-0.3643	-0.3489	-0.5441*
	(-1.21)	(-1.20)	(-1.06)	(-1.69)
POST×TREAT	**0.9403*****	**0.7563****	**0.8134****	**0.9568*****
	(2.77)	**(2.17)**	**(2.41)**	**(2.73)**
Controls	Yes	Yes	Yes	Yes
Merger Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
N	9795	9795	9795	9795
Pseudo R^2	0.3957	0.3953	0.3958	0.3962

Notes: This table presents the regression results with alternative definitions of treated clients. *TREAT*$_1$ equals one when (1) *TREAT* equals one, and (2) the more competent auditor in the merger is an industry expert (i.e., ranked as a top five auditor in terms of industry market share). *TREAT*$_2$ equals one when (1) *TREAT* equals one, and (2) the distance of the industry market share rank between the two audit firms is at least five. *TREAT*$_3$ equals one when (1) *TREAT* equals one, and (2) the within-audit firm industry portfolio share is larger than that of the other audit firm, where the industry portfolio share is computed as the number of listed clients in that particular industry divided by the total number of clients. *TREAT*$_4$ equals one when (1) *TREAT* equals one, and (2) the total assets of clients in that particular industry audited by the audit firm are larger than those of the other audit firm. Panel A presents the logistic regression results of using *MISSTATEMENT* as the dependent variable. Panel B presents the logistic regression results of using *MAO* as the dependent variable. The full set of control variables (as in Table 3 or 4) are included but not reported for brevity. Details on the definition and construction of the variables reported in the table are available in the Appendix. *z*-statistics shown in parentheses are adjusted for clustering by client. *, **, *** indicate significance at the 10%, 5%, and 1% levels (two-tailed), respectively.

TABLE 6: Restricted Sample without Audit Personnel Movement

	(1) *MISSTATEMENT*	(2) *MAO*
POST	-0.1171	-0.1392
	(-0.92)	(-0.88)
TREAT	0.6035***	-0.5788*
	(2.72)	(-1.69)
POST×TREAT	**-0.6564*** **	**0.9647*** **
	(-2.63)	**(2.63)**
Controls	Yes	Yes
Merger Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes
N	7058	7058
Pseudo R^2	0.1686	0.4261

Notes: This table presents the regression results for a restricted sample in which both the engagement partner and the review partner for the client company after the merger belong to the client's audit firm before the merger. We manually verify each partner's employment history from the auditor resumes provided by the CSRC. Column 1 presents the logistic regression results of using *MISSTATEMENT* as the dependent variable. Column 2 presents the logistic regression results of using *MAO* as the dependent variable. The full set of control variables (as in Table 3 or 4) are included but not reported for brevity. Details on the definition and construction of the variables reported in the table are available in the Appendix. *z*-statistics shown in parentheses are adjusted for clustering by client. *, **, *** indicate significance at the 10%, 5%, and 1% levels (two-tailed), respectively.

TABLE 7: Augmented Sample including Dropped Clients

	(1) *MISSTATEMENT*	(2) *MAO*
POST	-0.0672	-0.0682
	(-0.65)	(-0.53)
TREAT	0.4357**	-0.0342
	(2.24)	(-0.14)
POST×TREAT	**-0.4756****	**0.6946****
	(-2.18)	**(2.52)**
TREAT_DROP	0.5821**	0.7481*
	(2.01)	(1.94)
POST×TREAT_DROP	-0.6152	-0.6931
	(-1.51)	(-1.39)
CONTROL_DROP	0.6505***	0.2441
	(3.30)	(1.06)
POST×CONTROL_DROP	-0.6347**	-0.4523
	(-2.43)	(-1.50)
Controls	Yes	Yes
Merger Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes
N	11480	11480
Pseudo R^2	0.1373	0.3809

Notes: This table presents the regression results for an augmented sample including client companies that switched audit firms after the merger. *TREAT_DROP* is a dummy variable that equals one for dropped client companies that would have been classified as a treatment firm, and *CONTROL_DROP* is a dummy variable that equals one for dropped client companies that would have been classified as a control firm. Column 1 presents the logistic regression results of using *MISSTATEMENT* as the dependent variable. Column 2 presents the logistic regression results of using *MAO* as the dependent variable. The full set of control variables (as in Table 3 or 4) are included but not reported for brevity. Details on the definition and construction of the variables reported in the table are available in the Appendix. *z*-statistics shown in parentheses are adjusted for clustering by client. *, **, *** indicate significance at the 10%, 5%, and 1% levels (two-tailed), respectively.

TABLE 8: Constant Sample and Pre-Trends

	(1) *MISSTATEMENT*	(2) *MAO*	(3) *MISSTATEMENT*	(4) *MAO*
POST	0.2085	-0.1529	0.2420	0.0634
	(1.13)	(-0.68)	(0.97)	(0.22)
TREAT	0.3140	0.0430	0.5232	-0.3029
	(0.91)	(0.10)	(1.16)	(-0.53)
POST×TREAT	**-0.7972****	**0.9458****	**-1.0059****	**1.2890****
	(-1.98)	**(2.50)**	**(-1.97)**	**(2.45)**
BEFORE_1YR			0.0640	0.3738
			(0.27)	(1.38)
BEFORE_1YR×TREAT			**-0.4148**	**0.5589**
			(-0.76)	**(0.85)**
Controls	Yes	Yes	Yes	Yes
Merger Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
N	4172	3974	4172	3974
Pseudo R^2	0.2049	0.4470	0.2051	0.4488

Notes: The sample in this table is restricted to a constant sample of client companies over a five-year window around the audit firm merger. To investigate possible pre-trends, we create a dummy variable (*BEFORE_1YR*) that equals one for observations in the year before the merger (i.e., Year –1), and include in the baseline regression this dummy variable and its interaction with *TREAT*. Columns 1 and 3 present the logistic regression results of using *MISSTATEMENT* as the dependent variable. Columns 2 and 4 present the logistic regression results of using *MAO* as the dependent variable. The full set of control variables (as in Table 3 or 4) are included but not reported for brevity. Details on the definition and construction of the variables reported in the table are available in the Appendix. *z*-statistics shown in parentheses are adjusted for clustering by client. *, **, *** indicate significance at the 10%, 5%, and 1% levels (two-tailed), respectively.

TABLE 9: Alternative Control Clients

	(1) *MISSTATEMENT*	(2) *MAO*	(3) *MISSTATEMENT*	(4) *MAO*
POST	-0.1001	-0.0099	0.1082	-0.0497
	(-0.95)	(-0.07)	(0.77)	(-0.27)
TREAT	0.3760	-0.0709	0.4402	-0.7128
	(1.63)	(-0.21)	(1.53)	(-1.63)
POST×TREAT	**-0.5895*****	**0.7061****	**-0.8271*****	**0.7520****
	(-2.63)	**(2.33)**	**(-3.45)**	**(2.26)**
Controls	Yes	Yes	Yes	Yes
Merging Firm Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
N	9713	9486	5330	5292
Pseudo R^2	0.1793	0.4135	0.2038	0.4052

Notes: We include merging audit firm fixed effects (instead of merger fixed effects) in this analysis. Columns 1 and 2 use the full sample. Columns 3 and 4 restrict the control group to those clients that belong to an industry whose within-audit firm portfolio share is no larger than that of the treated clients. Columns 1 and 3 present the logistic regression results of using *MISSTATEMENT* as the dependent variable. Columns 2 and 4 present the logistic regression results of using *MAO* as the dependent variable. The full set of control variables (as in Table 3 or 4) are included but not reported for brevity. Details on the definition and construction of the variables reported in the table are available in the Appendix. *z*-statistics shown in parentheses are adjusted for clustering by client. *, **, *** indicate significance at the 10%, 5%, and 1% levels (two-tailed), respectively.

TABLE 10: Alternative Definition of the *POST* Variable

	(1) *MISSTATEMENT*	(2) MAO
TREAT	0.4196**	-0.1151
	(2.13)	(-0.44)
*POST*_0	0.1936*	0.1448
	(1.92)	(1.10)
POST*_0×*TREAT	**-0.3495**	**0.6062****
	(-1.51)	**(1.99)**
*POST*_13	-0.3324**	-0.2382
	(-2.38)	(-1.38)
POST*_13×*TREAT	**-0.6608****	**0.7808****
	(-2.20)	**(2.39)**
Controls	Yes	Yes
Merger Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes
N	9795	9795
Pseudo R^2	0.1496	0.3978

Notes: This table presents the logistic regression results with an alternative definition of the *POST* variable. *POST*_0 equals one if the client observation belongs to the merger event year, and zero otherwise. *POST*_13 equals one if the client observation belongs to the three-year period after the merger event year, and zero otherwise. Column 1 presents the logistic regression results of using *MISSTATEMENT* as the dependent variable. Column 2 presents the logistic regression results of using *MAO* as the dependent variable. The full set of control variables (as in Table 3 or 4) are included but not reported for brevity. Details on the definition and construction of the variables reported in the table are available in the Appendix. *z*-statistics shown in parentheses are adjusted for clustering by client. *, **, *** indicate significance at the 10%, 5%, and 1% levels (two-tailed), respectively.

TABLE 11: Audit Fees

Panel A: Descriptive Statistics of *FEE* (¥000)

	TREAT=1		*TREAT*=0	
	N	Mean	N	Mean
Pre-Merger	596	596.1	2504	679.4
Post-Merger	925	760.8	3661	863.9
Difference		164.7		184.5
[*p*-value]		[*p*<0.001]		[*p*<0.001]
Difference-in-Differences		-19.73		
[*p*-value]		[*p*=0.597]		

Panel B: Models of *FEE*

Dependent Variable: *FEE*	(1)	(2)
POST	0.1915***	0.0735***
	(18.47)	(6.35)
TREAT	-0.1033***	-0.0812***
	(-2.69)	(-2.89)
POST×TREAT	**0.0061**	**-0.0131**
	(0.23)	**(-0.62)**
SIZE		0.3256***
		(25.81)
LEV		0.1253**
		(2.37)
ROA		0.1734
		(1.08)
LOSS		0.0244
		(0.96)
GROWTH		-0.0206*
		(-1.77)
CURRENT		-0.0028
		(-0.62)
AGE		0.0043
		(0.20)
TENURE		0.0196
		(1.03)
MAO		0.1389***
		(2.81)
Merger Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes
N	7686	7686
Adjusted R^2	0.2207	0.5746

Notes: The sample in this table is restricted to mergers over the period 2001 to 2013 because client companies started to disclose audit fees in 2000. Panel A reports the descriptive statistics of *FEE*. The *p*-values of mean differences are reported in brackets. Panel B presents the OLS regression results of using *FEE* as the dependent

variable. Details on the definition and construction of the variables reported in the table are available in the Appendix. For *FEE*, *SIZE, AGE* and *TENURE,* log-transformed values are used in the regressions. *t*-statistics shown in parentheses are adjusted for clustering by client. *, **, *** indicate significance at the 10%, 5%, and 1% levels (two-tailed), respectively.

ONLINE APPENDIX

(NOT INTENDED FOR PUBLICATION)

TABLE A1: Removing Mergers Involving International Big N

	(1) *MISSTATEMENT*	(2) *MAO*
POST	-0.0823	-0.0533
	(-0.78)	(-0.40)
TREAT	0.3907*	-0.0579
	(1.94)	(-0.22)
POST×TREAT	**-0.5234****	**0.6819****
	(-2.36)	**(2.40)**
Controls	Yes	Yes
Merger Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes
N	9474	9474
Pseudo R^2	0.1467	0.4007

Notes: This table presents the logistic regression results after removing all mergers involving the international Big N (three cases). Column 1 presents the logistic regression results of using *MISSTATEMENT* as the dependent variable. Column 2 presents the logistic regression results of using *MAO* as the dependent variable. The full set of control variables (as in Table 3 or 4) are included but not reported for brevity. Details on the definition and construction of the variables reported in the table are available in the Appendix. *z*-statistics shown in parentheses are adjusted for clustering by client. *, **, *** indicate significance at the 10%, 5%, and 1% levels (two-tailed), respectively.

TABLE A2: Removing the Merger Event Year

	(1) *MISSTATEMENT*	(2) *MAO*
POST	-0.2999**	-0.1470
	(-2.11)	(-0.86)
TREAT	0.4063**	-0.1484
	(2.03)	(-0.56)
POST×TREAT	**-0.6219****	**0.7535****
	(-2.08)	**(2.34)**
Controls	Yes	Yes
Merger Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes
N	7896	7896
Pseudo R^2	0.1408	0.3957

Notes: This table presents the logistic regression results after removing observations in the merger event year. Column 1 presents the logistic regression results of using *MISSTATEMENT* as the dependent variable. Column 2 presents the logistic regression results of using *MAO* as the dependent variable. The full set of control variables (as in Table 3 or 4) are included but not reported for brevity. Details on the definition and construction of the variables reported in the table are available in the Appendix. *z*-statistics shown in parentheses are adjusted for clustering by client. *, **, *** indicate significance at the 10%, 5%, and 1% levels (two-tailed), respectively.

TABLE A3: Controlling for Merger×Industry Fixed Effects

	(1) *MISSTATEMENT*	(2) *MAO*
POST	-0.0985	-0.0443
	(-0.21)	(-0.10)
TREAT	0.5133	-0.2051
	(1.12)	(-0.55)
POST×TREAT	**-0.5147****	**0.7197****
	(-2.13)	**(2.25)**
Controls	Yes	Yes
Merger×Industry Fixed Effects	Yes	Yes
N	5956	5189
Pseudo R^2	0.0346	0.3673

Notes: This table presents the results for the logistic model after controlling for merger×industry fixed effects. Column 1 presents the results of using *MISSTATEMENT* as the dependent variable. Column 2 presents the results of using *MAO* as the dependent variable. The full set of control variables (as in Table 3 or 4) are included but not reported for brevity. Details on the definition and construction of the variables reported in the table are available in the Appendix. *z*-statistics shown in parentheses are adjusted for clustering by client. *, **, *** indicate significance at the 10%, 5%, and 1% levels (two-tailed), respectively.

TABLE A4: Linear Probability Model

	(1) *MISSTATEMENT*	(2) *MAO*
POST	-0.0004	0.0063
	(-0.06)	(1.18)
TREAT	0.0232*	-0.0118
	(1.66)	(-1.09)
POST×TREAT	**-0.0310****	**0.0285****
	(-2.28)	**(2.23)**
Controls	Yes	Yes
Merger Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes
N	9795	9795
Adjusted R^2	0.0896	0.2690

Notes: This table presents the regression results for the linear probability model. Column 1 presents the OLS regression results of using *MISSTATEMENT* as the dependent variable. Column 2 presents the OLS regression results of using *MAO* as the dependent variable. The full set of control variables (as in Table 3 or 4) are included but not reported for brevity. Details on the definition and construction of the variables reported in the table are available in the Appendix. *t*-statistics shown in parentheses are adjusted for clustering by client. *, **, *** indicate significance at the 10%, 5%, and 1% levels (two-tailed), respectively.